



An Experiment Reconsidered:

The Theory and Practice Of Armored Warfare in Spain

October 1936 – February 1937 (Part 1 of 2)

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Over fifty years after its conclusion, the Spanish Civil War of 1936-1939 continues to pose a problem for historians of armored warfare: In seeking the roots of the mechanization-oriented doctrines which were to become a prominent feature of World War II, some historians have held that Spain was an almost ideal tactical laboratory; others have concluded that experiments conducted there yielded few if any definite conclusions.¹ These opinions, although diametrically opposed on the question of Spain's viability as a testing ground, share a common foundation: an assumption that only grand tactics are deserving of the military intellectual's attention. The most prominent military intellectuals of the interwar period

took this assumption more or less at face value: If tactically independent mechanized corps were massed in sufficient density against a sufficiently narrow segment of the enemy's defenses — a strategically significant success would follow. Small unit tactics — particularly those involving the close coordination of tanks with non-mechanized infantry — would scarcely matter where the tank formations were too small to meet the larger requirement.

From October 1936 to February 1937, as Francisco Franco's Nationalist rebels laid siege to Republican Madrid, contemporary military intellectuals were proven wrong. Neither the German *Imker*

Drohne group aiding Franco nor the Soviet Krivoshein Detachment, which brought the tank to the Republic's Popular Army (*Ejercito Popular*), possessed enough tanks to execute the tactically independent exploitations envisioned by interwar theorists. Tank companies were employed piecemeal, in support of dismounted infantry, and often without the element of surprise. Nevertheless, tank forces proved useful in these limited operations once effective small unit tactics had been developed. Moreover, contrary to another article of contemporary conventional wisdom, the Germans were not the only ones to benefit from experimentation in the "Spanish Laboratory;" their Soviet counterparts not only learned, but learned first. Early Republican tank operations, although hardly the theoretical

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ideal of mechanized mobility, bought time for Madrid's defenders and contributed to a strategically significant result; the capital remained in Republican hands until the war's final campaign well over two years later.

Balanced assessments of armored warfare in the Spanish war — particularly that war's opening phase — are rarely seen; works that focus on World War II or encompass the entire history of the tank either avoid this subject altogether or treat it cursorily — as a prologue to more significant events. A more detailed examination of tank employment in Spain is therefore necessary. The first problem encountered in such an examination is the historiographical one mentioned above. The "laboratory" and "false start" schools were both conceived to explain military disasters of 1940 and 1941, rather than those of the Spanish conflict, and the evidence was duly cooked. Only when these after-the-fact rationalizations are stripped away does the true picture emerge: the experimenters were far less sure of themselves than is often supposed. Both sides addressed the promise of independent mechanized operations, but had done so fitfully and with reservations. So, too, did both sides employ recently designed tanks only to find that those tanks were not always ideally suited for the missions they performed. Training was difficult and, even when successful, could not always atone for limitations of doctrine and technology.

Hindsight or History?

Conditions in a laboratory can be controlled, and it is extraordinary that a combat veteran would liken a war zone to one. But Ferdinand O. Miksche did precisely that. Miksche, a Czech artillery officer who commanded an artillery group in the Spanish Republic's *Ejército Popular*, was the first to propose that the "Spanish Laboratory," as he called it, was ideal for the testing of mechanized tactics.² "The pace was slower and the scale was smaller" than that of later operations in Poland, France, and North Africa, he reasoned. Written in the aftermath of the French army's 1940 collapse, Miksche's *Attack: A Study of Blitzkrieg Tactics* was a resounding I-told-you-so which treated the operations of the German *Imker Drohne* advisory group operating with Franco's Nationalists as unqualified successes. "The road that the evolution of war was taking could not fail to be seen by an attentive observer who studied it in Spain," lamented Miksche in his introduction, and the French clearly were not paying attention. Only the Germans "learned...that war had changed" and

Heinz Guderian's armored drive to the mouth of the Somme was proof enough of that. Tellingly, Miksche did not see the Soviet tank officers operating on his own side as innovators, but regarded them instead as slaves to the same antiquated tactical conception as that of the French. Republican tanks in 1937, like French tanks in 1940, were largely infantry support weapons, parceled out to line units in small groups, rather than concentrated for effective offensive or counter-offensive actions.

As is so often the case with such pointed theses, this one was oversimplified. In 1939, Miksche had attempted to warn Western military authorities that Guderian's *schwerpunkt*, or thrust point, tactics were indeed viable. The warning had been taken lightly, and Miksche's selection of historical evidence for *Attack* was correspondingly tendentious. He ignored even more concerted — and earlier — Soviet attempts at tactical reform, especially those of the first two senior tank officers in Republican Spain: Lieutenant-Colonel Semyon M. Krivoshein and his successor, Major-General Dmitri G. Pavlov. Not only did the Soviet field regulations of 1936 deem independent mechanized operations necessary, but their rejection over the next three years had little to do with tactical failures in Spain; Mikhail N. Tukhachevsky, their chief proponent, was executed for espionage and treason in June of 1937. Nor did Miksche note that, by February 1937 — scarcely four months after their arrival — the *panzer* crews of Wilhelm Ritter von Thoma's *Imker Drohne* group had been repeatedly ordered to avoid enemy tanks.³ Not until early 1939 were those *panzers* committed under *Spanish command* to a war-winning offensive. Nevertheless, Miksche's glowing assessment of the *Wehrmacht*'s "Spanish Laboratory" was taken at face value by a generation of *blitzkrieg* victims in search of an explanation.

The seeds of the historiographical counterpoise to Miksche were sewn in June, 1941, when the Soviet West Front, under the command of Dmitri Pavlov, collapsed. This collapse resulted partly from the misapplication of conclusions that Pavlov had formulated while serving in Spain. Frustrated with the failure of independent armored operations there, and knowing that Tukhachevsky had incurred Stalin's wrath, Pavlov convinced the People's Commissariat for Defense in July 1938 that tanks were suited only to the close support of infantry formations.⁴ He had also replaced Tukhachevsky as his army's senior tank officer, and his views held official credibility on that

account as well. In July 1939, the four Soviet armored corps were disbanded, and the brigades of their component divisions were distributed among infantry divisions. For Miksche, Pavlov's 1941 defeat indicated that the Soviets, like the French, had neither learned from the Spanish experience nor heeded the findings of those who had.⁵ However, when German accounts became available after World War II, a different picture emerged. Thoma spoke not of a perfect laboratory, but of practical limitations which rendered effective mechanized experimentation impossible. Similarly, Guderian believed contemporary developments in Germany to be much more important. A bizarre byproduct of this interpretation was the partial rehabilitation of Pavlov — from moron to ignoramus: He failed on the West Front because he could not possibly have learned anything of value in Spain anyway. More important was the historiographical effect wielded by the Allies' reversal of their earlier fortunes. Just as the *blitzkrieg*'s victims sought an explanation for its short term success, its designers now grasped at any opportunity to account for its ultimate failure.

Imported Theories: A Common Thread

German doctrinal reform of 1926-1937 paralleled its Soviet counterpart in content as well as timing, although the similarities were to be obscured by comparisons of the *blitzkrieg*'s success to Pavlov's 1941 failures. Before Tukhachevsky's downfall, however, the mutual affinity of Soviet theorists and their "bourgeois" German contemporaries was strong. That affinity had been fostered during the 1920s by joint military exercises conducted under a secret provision of the Rapallo Pact. During those exercises, Tukhachevsky studied the reform initiatives of Hans von Seeckt. As chief of the *Reichswehr*'s troop bureau and de facto Chief of Staff from 1920 until his death in 1926 Seeckt argued that, contrary to the apparent lessons of the recent World War, the defense was not inherently superior: "Science," he observed, "works for both sides."⁶ Although inclined toward small mobile forces, Seeckt, like Tukhachevsky, held that, even with their mechanical limitations, vehicles held significant advantages over men. Guderian also considered Tukhachevsky's work carefully: "[T]here is something to be said for the way the Russians have organized their [tank] forces," he later noted. But this approval was conditional; the Soviet demand for immediate infantry support, long range artillery support, and independent tanks required

“a whole inventory of specialized tanks, with all the attendant disadvantages.”⁷

Guderian intended that the tank fulfill its potential for concentrated independent action against the thrust point, but continued to address the need for cooperation with non-mechanized infantry. Inherent in this compromise were two equally weighted reservations. On the one hand, he criticized those who sought to limit tanks to the infantry support role as prone to underestimate the tank’s firepower while overestimating that of equally untested antitank guns:

*It is alleged that the defense will no longer be susceptible to surprise by tanks; [that] antitank guns and artillery always find their mark, regardless of their own casualties, of smoke, fog, trees, or other obstacles and ground contours; the defense too, is always located exactly where the tanks are going to attack; with their powerful binoculars, they can easily see through smoke screens and darkness, and despite their steel helmets they can hear every word that is said.*⁸

On the other hand, he warned:

*[A]s with all innovations in the field of military technology, it is unwise to jump to conclusions before undertaking a serious examination of the pros and cons of new forces and the necessary counter-measures. Otherwise, there will be some painful surprises in store when it comes to real combat.*⁹

Like Tukhachevsky, Guderian had surmised that coordinating with muscle-powered infantry did not necessarily mean co-locating with it in all situations. However, Guderian was far more determined that the new tactical guidance be more adaptable than the old. Local commanders — not field regulations — should determine the direction and formation of an assault because those decisions depended ultimately upon the composition of the attacking force, enemy dispositions, and terrain. Tanks should precede infantry in exposed areas, follow infantry where sufficient engineer and artillery support was available, and attack the infantry’s objective from a different direction if the terrain allowed.¹⁰ This demand for flexibility, rather than the simultaneous demand for an independent mechanized capability, distinguished the German guidance from its Soviet counterpart.

But even Guderian expected that tactical flexibility would be circumscribed by technology, organization, and training. Where technology was concerned, different missions called for different tank types: The close support variant needed much armor protection, but only light

armament: “a modicum of defense against enemy tanks.”¹¹ Conversely, the exploitation-and-pursuit mission demanded a sacrifice of some armor in the interests of speed and, especially, firepower. Well before the Spanish Civil War, Guderian specified a main gun of up to 75mm because he regarded future tank-versus-tank combat as an absolute certainty. As for organization, infantry support tanks would operate in small detachments whereas independent mechanized action called for large formations composed of tanks and lightly armored infantry carriers. Each type of formation required specialized training. Tank officers detailed for infantry support were *de facto* advisors to infantry commanders, rather than unit commanders in their own right. In contrast, those leading exploitations were dictating the course of events and therefore required command, as well as technical, training. Only when employed in the independent role could tanks contribute directly to a long term, strategically significant result. By 1936, Guderian’s superiors were intent on putting this theory, as well as their tanks, to the test. Thoma later hinted, a bit defensively, that Spain’s role as a “European Aldershot” had been designated at higher levels of command than his own.¹²

Unlike the Germans, who practiced armored warfare in secret because the Versailles Treaty had prohibited their possession of tanks, the Soviets suffered more from limitations of domestic origin. When appointed as Army Chief of Staff in 1925, Tukhachevsky inherited an organization in which tactical and technological modernization had been thwarted, not only by the lack of a viable automotive industry, but by the then prevailing interpretation of Marxist-Leninist dogma. Leon Trotsky, the People’s Commissar for Military Affairs until 1923, had favored large, semi-trained militias as the only true military expression of proletarian revolutionary zeal. His successor, Mikhail V. Frunze, allowed that even violent political revolution was to be effected by bourgeois military methods, but Frunze’s premature death in 1925 left some ramifications of this reinterpretation unclear.¹³ Although official support for modernization had taken hold by the first Five Year Plan’s initiation in 1927, the first and second priorities went to infantry and artillery, respectively. Thus, although the Revolutionary Military Council’s Summer 1929 *Preliminary Correct Line for the War Doctrine of Tanks* reflected the Party’s desire for both new armored forces and the motorization of extant maneuver arms — infantry and cavalry — the first stage of that policy’s implementation took another two years.¹⁴

The most significant advances, both tactically and technologically, occurred during Tukhachevsky’s tenures as Director of Armaments (1931-1934) and as a Director of the Military Soviet (1934-1937). The Soviet Army’s 1932 *Combat Regulations for Mechanized Forces*, which also reflected the influence of Tukhachevsky’s former Deputy Chief of Staff, Vladimir K. Triandafillov, served as a starting point for both tank design and employment. Under this policy, each of three distinct tank missions was assigned its own purpose-built tank, and the likelihood of overlap between one category and the next was generally minimized. Light tanks grouped into *N[ieposredstvennoy] P[odierzhki] P[iechotiy]*, or short range infantry support formations, were to supply direct support to conventional infantry formations operating against the enemy’s front lines. Infantry support against successive defensive belts between 1.5 and 2.5 kilometers from the line of departure was to be provided by heavy tanks of the *D[alshiy] P[odierzhki] P[iechotiy]*, or long range infantry support formations. Lastly, independent mechanized operations against enemy headquarters, reserve, and artillery elements were the province of the *D[alnogo] D[ieystviya]*, or long range operation group, equipped with *B[ystrochodny] T[anki]*, or fast tanks.¹⁵

In the 1932-3 expositions of this three-tiered concept, infantry support tanks outnumbered the fast tanks at least partly because the latter represented a controversial and untested departure from linear tactics. If the fast tanks could indeed exploit gaps created by the other formations, the extent of those exploitations was open to question, and the guidance for DD groups, the *Preliminary Instructions for Waging Deep Battle*, did not gain official approval until 1935. Tukhachevsky continued to test the concept intensively and, although the next doctrinal revision retained the infantry support and independent functions outlined in 1932, the exploitation was now receiving as much attention as the breakthrough. According to the Provisional Field Service Regulations of 1936, *P[olevoy] U[stav]-36*, a decisive victory could only be achieved by offensive action in depth. But Tukhachevsky and his followers also noted a caveat which applied especially to technologically sophisticated forces such as the DD group:

It is impossible to be equally strong everywhere. To guarantee success, troops and war material must be deployed in such a way that superiority is obtained at the decisive points. On sectors of secondary importance, all that is necessary is

the employment of sufficient forces to hold the enemy.¹⁶

This emphasis on concentration against decisive points was a direct reflection of Tukhachevsky's familiarity with "bourgeois" tactical theories; theories whose acceptance in the Soviet Union stemmed partly from the fact that a now out-of-favor Trotsky had earlier dismissed them. More specifically, it was a common denominator shared with Guderian's *Schwerpunkt und Aufrollen* conception of mechanized warfare. So, too, was *PU-36*'s demand for cooperation of all combat arms and the employment of each "under the conditions most favorable for developing its possibilities to the fullest extent." However, although Soviet doctrine of the 1930s often expressed the same general principles as its German counterpart, it also retained elements of the earlier, non-Western fixation on mass: Even though *PU-36* urged offensive action "throughout the whole depth of [the enemy's] position" for an attacker who could not be "equally strong everywhere," it added with equal conviction that "the simultaneous defeat of the enemy along the whole of his battlefield" was technologically possible.¹⁷ Calling the previous generation's linear tactics into question, *PU-36* had thus retained at least some of that generation's linear orientation, especially where the use of massed artillery and air support at higher operational levels was concerned. This duality had no direct German equivalent, and probably stemmed from Tukhachevsky's own knowledge of the fast tank's limitations; knowledge which had been gained since 1932. Although fast tanks had been designed to destroy the enemy's artillery and prevent the concerted action of his reserves, redundancy in the form of massive indirect fire support would help preserve the "harmonic" aspect of combined arms offensives.¹⁸

Krivoshein's selection as the first commander of Soviet tank forces in Spain stems as much from his fundamental agreement with Tukhachevsky's conception of future wars as from his command experience in field training exercises of the early 1930s. Conceding that the infantry support mission was still relevant, Krivoshein had increasingly viewed the tank as "a very important instrument of pursuit," a view which he still held in October 1936, when his advisory detachment deployed to Spain.¹⁹

Imported Tanks: The Soviet Advantage

When the first shipment of Soviet tanks arrived at Cartagena on 16 October 1936, the tactics to which Krivoshein had



committed were yet in a state of transition. Official acceptance of *PU-36* was over two months away and would be temporary in any case. And although Krivoshein himself adhered to the principles of Deep Battle, his tankers came from different units, some of which had trained only for close support operations. In the following weeks, as the detachment's cadre began to select and train Spanish Republican *tanquistas*, it also learned.

Soviet tank design, like Soviet tactics, reflected a need for both independent and infantry support missions. The 50 tanks unloaded at Cartagena belonged to the T-26 series, originally designed for the latter. These equipped the first four Republican tank battalions to be organized. The fifth battalion, and several subsequent ones, used the BT-5, a vehicle intended solely for independent mechanized operations. Not only did subsequent events in Spain suggest that this strict division of responsibilities was far less sound in practice than in theory, but the two tanks were remarkably similar in terms of armor and armament. The T-26 series was a direct descendant of the British Vickers "six-ton," 15 of which had been purchased on Tukhachevsky's order in 1931. Originally equipped with dual side-by-side turrets, subsequent variants, including the later T-26B1s, mounted a single hull-width turret housing a 45mm main gun and coaxial 7.62mm machine gun. The new main armament, although effective against machine gun emplace-

The Soviet T-26B was the most common tank on the Republican side, and clearly out-classed the German and Italian armor employed by the Nationalists.

ments, was the same as that carried by the BT-5, and the T-26's top speed of 23 miles far exceeded that of a walking infantryman. Like its British precursor, the T-26B1 carried the designation light tank, but was over three tons heavier and embodied a number of added design features which in retrospect make doctrinal distinctions between it and the fast tank appear artificial. The periscopic sight featured Zeiss optics, and many later models came equipped with a photoelectric firing circuit, which enabled gunners to engage moving targets more easily — when it was working. Radios were equally important in wide-ranging tactically independent operations, and most early T-26s carried them as well.²⁰

The BT-5 also evolved from a foreign prototype tested at Tukhachevsky's behest in 1931. This was J. Walter Christie's T-3 design: a model that American ordnance experts had rejected. Like the T-26A, the first production BTs mounted machine guns only, but the same 45mm gun was added soon thereafter. The BT-5's frontal armor was 13mm thick, as opposed to 15mm for the T-26, and it weighed in at 11.2 tons combat loaded — less than two tons more than its stable mate. Also suggestive of accidental doctrinal overlap between officially dif-

ferent roles is the retention of the T-26B1 turret — with its infantry handrail — on BT-5s. Only the BT-5's top speed under ideal conditions — 36 miles per hour — set it apart from the T-26B1 but, because conditions in Spain were seldom ideal, the extra 13 miles per hour was rarely attained.²¹ Moreover, not even devotees of independent mechanized action always agreed on the need for speed. B.H. Liddell Hart, for example, argued that the BT's high power-to-weight ratio did not make for accurate gunnery, and his argument was, to a large extent, borne out: When reporting on his first few tank operations in Spain, Krivoshein emphasized that most effective large caliber gunnery occurred from the halt, and that effective coordination of tanks and infantry was the tactical ingredient most sorely lacking.²² One reason for this deficiency was the three-man crew. Because the gunner doubled as tank commander, simultaneous firing and communication with supported elements was impossible.

The implicit message from the Madrid Front between October 1936 and March 1937 was clear: whatever promise independent mechanized action held at the operational and strategic levels, frequent combined arms operations involving tanks and dismounted infantry were to be expected regardless of the larger scenario. The corollary, of course, was that local conditions might require light infantry support tanks to participate in fast tank operations and, by late 1937, infantrymen were riding into combat on both types. Not surprisingly, post-1939 BTs and their more famous successors, the T-34s, retained both reasonable degrees of speed and infantry rails. These two features underscore the stark disparity between an overly complicated peacetime theory and its less elaborate wartime expression.

Germany's first mass production tank reflected less of Guderian's tactical philosophy. The *Panzerkampfwagen* Mark IA had begun in 1932 as a prototype for an armored anti-aircraft gun carriage rather than a tank. Only during the next two years, as Guderian's theories were gaining acceptance, was a tank turret added, but that improvement came at a cost: Although roofed and capable of 360-degree traverse, the new turret mounted two 7.92mm machine guns, rather than the original 20mm AA weapon. Smaller weapons meant more ammunition and, because the resulting hybrid was intended primarily for training purposes, this increase was deemed far more important than the simultaneous loss of firepower. The Mark IA weighed 5.4 tons, had frontal armor of 15mm, and carried a basic load of 1,525 rounds.

Considerably smaller than its Soviet counterparts, it was limited to a crew of two: a driver and a gunner/commander who also served as the loader.²³ Well before 25 August 1936, when the first shipment of Mark Is reached Nationalist forces, larger purpose-built medium tanks were on German drawing boards, but none were available for Thoma. As a result, *Imker Drohne* tank crews stood no chance in tank-versus-tank combat against Republican opponents.

Training the *Tanquistas*

The subsequent showdown on the Madrid Front (Central Front was the Republican designation) also introduced an element of default over the next five months: when armored exploitations proved impractical, the consequent pressure on conventional infantry formations was likely to increase the number of requests for tanks in the close, direct fire support role. And these requests usually originated among infantrymen who could not have cared that theorists had intended at least some of those tanks for other missions. Guderian and Tukhachevsky both preferred larger, domestic maneuvers, and each viewed his nation's military involvement in Spain as a dubious, politically motivated venture.²⁴ However, matters were now beyond their control and, when committed to combat, general theories would be of little use without specific modifications. Those modifications, made by both advisory groups, sometimes contravened official guidance but were made nevertheless. Miksche's overstated, hindsight-oriented comparisons of Soviet stagnation and German innovation say little of this bottom-to-top phase of doctrinal formulation. So, too, do those comparisons belie the fact that Soviet officers far more attuned to the tank's operational potential than Pavlov — Konev, Rokossovsky, and Malinovsky, for example — adopted small unit infantry support tactics in Spain when necessary. Forearmed more with ideas than experiences, Krivoshein and Thoma collided with the Clausewitzian concept of friction as much as with each other: the theories were simple enough, but putting them into practice was another issue.

In Spain, a good deal of the friction occurred before combat. For Thoma, the situation was defined by Franco's initial failure to take Madrid. On 30 October 1936, Admiral Wilhelm Canaris of German military intelligence complained to Franco that Spanish battle tactics were not "promising of success" and that, due to the rebels' misuse of air power in small disjointed operations, many early advantages had gone unexploited.²⁵ From that

point forward, German forces were to be commanded by Germans, and German equipment was not to be used without German advice. Faced with an opponent who was also receiving outside assistance, Franco had no choice but to comply, and this compliance was to be effected even at the lowest levels of command. Spanish tankers were to learn from German instructors.

Thoma, who had personally arranged the armored assistance with Franco back in July, did not return to Spain until the August shipment of Mark Is, operated by scarcely trained Spanish crews, had already seen combat. He agreed with Canaris on the importance of training, but his initial calls for both German and Spanish volunteers fell far short of expectations. With less than 150 Germans in its initial complement and only around 600 when it reached maximum strength in 1938, *Imker Drohne* was a skeleton to be fleshed out by Spanish crewmen. Tank crews were integrated where possible, but the language barrier remained significant. Frustrated that the Spanish trainees were "quick to learn" but "also quick to forget" how to operate tanks, Thoma was equally disappointed with the Nationalist leadership's willful rejection of the *Schwerpunkt* tactics he sought to test:

*General Franco wished to parcel out the tanks among the infantry — in the usual way of generals who belong to the old school. I had to fight this tendency constantly in the endeavor to use the tanks in a concentrated way. The Francoists' success was largely due to this.*²⁶

On the other hand, the capacity of Thoma's small force to give the new doctrine a fair test remains questionable; in the opening battles around Madrid, he rarely had more than 50 Mark Is at his disposal.

Krivoshein's frequent failure to overcome an identical tendency among Republican commanders was probably no more significant a factor in the war's outcome, and he, like Thoma, labored under a prohibitive tank shortage. But he had other problems as well. Whereas Thoma's first volunteers all came from the 29th Armored Defense Regiment in Kassel, the Krivoshein Detachment was drawn from several different divisions of the Belorussian Military District, and few of its original 180-man complement had trained together. Moreover, a high percentage were administrative or maintenance personnel with no tank training, and most of the tankers were officers and senior NCOs. Beneath this cadre, only a third of the authorized enlisted men were

present, and the biggest shortage was among tank crewmen.²⁷

Far more desperate for Spanish volunteers than his German opponent, Krivoshein was also far more constrained by his superiors in matters of recruiting. Because the T-26 was a concrete manifestation of proletarian revolutionary might, only devout Communists were allowed to operate it.

Although Krivoshein would later write of his first trainees as "a Popular Front in miniature," accounts from the ranks indicate that non-Communists with mechanical backgrounds were often rejected in favor of more politically acceptable but technically unqualified inductees.²⁸ Worse yet, the instruction was conducted via an interpreter, for not one of Krivoshein's instructors spoke Spanish. The training, he dryly noted, "was not easy."

Nor was it always complete. Not all drivers knew how to get their tanks out of first gear and, in one instance, a tank commander broke contact with the enemy because he had not learned how to fire the main gun.

Even had the training conditions been ideal and the Spanish tankers appreciative of independent mechanized operations, an inescapable irony would have remained: Both Tukhachevsky and Guderian had intended such operations to preclude strategic stalemates. In Spain, however, all but a handful of the approximately 180 German and 700 Soviet tanks to see action arrived well after initial Spanish dispositions, political priorities, and physical geography had created precisely that problem. Although thinly defended in many places, the line separating Nationalist from Republican territory existed for the most part by October 1936. In the Madrid area, where political imperatives demanded that both tank forces be committed prematurely, ideal tank terrain was in limited supply.

Because of these geographic and political constraints, the technological superiority of Soviet armor came to matter only at the tactical level and, where imported doctrines were concerned, neither Guderian's *schwerpunkt* (thrust point) nor Tukhachevsky's *glubokiy boi* (deep battle) were to receive fair tests. By default, experimentation in the "Spanish Laboratory" degenerated into a series of *ad hoc* tactical adjustments by commanders who were understandably more concerned about accomplishing missions than proving theories.

Notes

¹Kenneth Macksey, *Guderian: Panzer General* (London: Macdonald and Janes, 1975), p. 72; J. Mackintosh, "The Development of Soviet Military Doctrine since 1918," in Michael Howard, ed., *The Theory and Practice of War: Essays presented to Captain B.H. Liddell Hart on his Seventieth Birthday* (New York: Praeger 1966), pp. 249-269; Robert O'Neill, "Doctrine and Training in the German Army, 1919-1939," in Howard, pp. 143-165; Ian V. Hogg, *Armour in Conflict: The Design and Tactics of Armored Fighting Vehicles* (London: Janes, 1980); Robert Citino, *Armored Forces: History and Sourcebook* (Westport, Conn.: Greenwood 1994).

²Ferdinand O. Miksche, *Attack: A Study of Blitzkrieg Tactics* (New York: Random House, 1942; reprinted., Carlisle, Penn.: U.S. Army War College, 1983), pp. vi, 9, 11.

³Manfred Merkes, *Die Deutsche Politik im Spanischen Burgenkrieg 1936-1939* (Bonn: Ludwig Rohrscheid, 1969), pp. 67-68; Werner Beumelburg, *Kampf um Spanien: die geschichte der Legion Condor* (Oldenburg: Gerhard Stalling, 1942), p. 36.

⁴John Milsom, *Russian Tanks, 1900-1970* (New York, Galahad, 1970), p. 52; David Glantz, *Soviet Military Operational Art: In Pursuit of Deep Battle* (London: Cass, 1991), pp. 92-93.

⁵Miksche, pp. 4-12 passim.

⁶Hans von Seeckt, "The Armies of Today," *Cavalry Journal*, vol. 39 no. 159 (April 1930), pp. 256-7.

⁷Heinz Guderian, *Achtung--Panzer! 1937*; (reprint ed., trans. Christopher Duffy, London: Cassell, 1995), p. 153.

⁸Guderian, in *Journal of the National Union of German Officers*, 15 Oct. 1937, reprinted in *Panzer Leader* (trans. Constantine Fitzgibbon, New York: Dutton 1952, reprint edition., New York: Da Capo, 1996), p. 39.

⁹Guderian, *Achtung*, p. 153.

¹⁰Guderian, *Panzer Leader*, pp. 39-44 passim; *Achtung*, pp. 154-155, 188-198 passim.

¹¹Guderian, *Achtung*, p. 169.

¹²Thoma, quoted in B.H. Liddell Hart, *The German Generals Talk* (New York: Wm. Morrow, 1948), p. 92.

¹³Walter D. Jacobs, *Frunze: The Soviet Clausewitz, 1885-1925* (The Hague: Martinus Nijhoff, 1969), pp. 20-1, 46-9, 52-3, 83-4; Milsom, p. 31; Glantz, pp. 74-76.

¹⁴Milsom, p. 31; Glantz, pp. 74-76.

¹⁵Milsom, p. 38; Mikhail N. Tukhachevsky, "New Questions of War," (written in 1932) in *Voyenno-Istoricheski Zhurnal* (February 1962), translated and reprinted in Richard Simpkin, *Deep Battle: the Brainchild of Marshal Tukhachevskii* (London: Brassey's, 1987), pp. 139-142; "The Development of Forms of Command and Control" in *Krasny Zvezda* (21 February 1934) translated and reprinted in Simpkin, pp. 155-156.

¹⁶PU-36, Chapter 1, Article 3, translated and reprinted in Simpkin, p. 178; also partially translated in Milsom, pp. 46-48.

¹⁷*Ibid.*, Chapter 1 Articles 7, 9. Milsom's translation of article nine uses "battle front," whereas Simpkin uses the less linear "tactical layout."

¹⁸PU 36, Articles 7-9 passim.

¹⁹Semyon M. Krivoshein, in *Taktik Schneller Verbände* (Potsdam: Voggenreiter Verlag, 1934), p. 42.

²⁰Milsom, pp. 83-86; Richard N. Ogorkiewicz, "Soviet Tanks," in Liddell Hart, ed., *The Soviet Army* (London: Weidenfeld & Nicholson, 1956), pp. 298, 300-302; Denis Bishop and Christopher Ellis, *Vehicles at War* (London: Allen & Unwin, 1979), p. 72; Macksey, *A History of Armored Fighting Vehicles*, (New York: Scribners, 1977), p. 57.

²¹Milsom, pp. 96-98; Macksey, *Armored Fighting Vehicles*, p. 139.

²²Ogorkiewicz, p. 300; Krivoshein, "Tanquistas Voluntarios Sovieticos en la Defensa de la Madrid," in N.N. Voronov, *Bajo de la Bandera de la Espana Republicana: recuerdan los voluntarios sovieticos participantes en la guerra nacional revolucionaria en Espana* (Moscow: Editorial Progreso, 1971) pp. 320-323. Originally published as "Tankisty Dobrovoltsy," in Voronov, *Pod Znamenem Ispanikoi Respubliki: 1936-1939* (Moscow: Nauka, 1965), pp. 446-468.

²³Ellis, *Tanks of World War II* (London: Octopus, 1981), p. 103; F.M. Senger and Etterlin, *German Tanks of World War II*, trans. J. Lucas (Harrisburg: Stackpole, 1969), pp. 21-23, figs. 11-15.

²⁴John Erickson, *The Soviet High Command: A Military-Political History* (London: Macmillan, 1962), pp. 428-436 passim; Matthew Cooper, *The German Army, 1933-45: Its Political and Military Failure* (New York: Stein and Day, 1978; reprint edition., Lanham, Md.: Scarborough House, 1985), p. 55.

²⁵Canaris, quoted in Peter Elstob, *The Condor Legion* (New York: Ballantine, 1973), pp. 107-8.

²⁶Thoma, quoted by Liddell Hart in *The German Generals Talk* (New York: William Morrow, 1948), pp. 92-3.

²⁷Krivoshein, "Tanquistas Voluntarios," pp. 320-323.

²⁸*Ibid.*, p. 324. Robert Gladnick, who commanded a section of Republican tanks, asserts that the politicized nature of tanker candidate selection prolonged the process unduly. See Robert Gladnick, quoted in Peter Wyden, *The Passionate War* (New York: Simon and Schuster, 1983), pp. 172-3.

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